Claims

That which is claimed is:

1. A method of extracting liquids from a process material, comprising:

compressing the process material;

decompressing the process material;

mixing the process material; and

recompressing the process material, wherein the steps of compressing, decompressing, mixing, and recompressing are performed in a mechanical screw press.

2. The method of Claim 1, wherein decompressing the process material and mixing the process material are performed simultaneously.

3. The method of Claim 1, wherein decompressing the process material and mixing the process material are performed sequentially.

4. The method of Claim 1, wherein the mechanical screw press comprises an assembly of worms and/or flights in a tunnel provided with a feed end and a discharge end.

5. The method of Claim 4, wherein the worm assembly comprises at least one mixer region.

6. The method of Claim 5, wherein the mixer region comprises an element adapted to disrupt a flow of the material.

7. The method of Claim 5, wherein the mixer region comprises at least one of a multirecessed cog and a toothed disc.

8. The method of Claim 5, wherein the mixer region further comprises a compressor region.

9. The method of Claim 8, wherein the mixer region comprises a frusto conical member.

10. The method of Claim 9, wherein the frusto conical member is smaller in diameter at a feed inlet end and greater in diameter at a discharge end.

11. The method of Claim 10, wherein the compressor region is positioned at the discharge end.

12. The method of Claim 10, wherein the compressor region is positioned at between 50 to 60% of the length of the worm assembly as measured from the feed inlet end.

13. The method of Claim 8, wherein the mixer region is positioned approximately in the middle of the worm assembly.

14. The method of Claim 8, wherein the compressor region is positioned at between 50 and 65% of the length of the worm assembly.

15. The method of Claim 4, wherein the worm assembly comprises a plurality of mixer regions.

16. The method of Claim 15, wherein the mixer regions are substantially evenly spaced along the length of the worm assembly.

17. The method of Claim 16, wherein a first mixer region is positioned between 25 to 40% of the length of the worm assembly, and a second mixer region is positioned between 60 and 80% of the length of the worm assembly.

18. The method of Claim 1, further comprising:

controlling flow of the process material using a temperature control element.

19. The method of Claim 1, wherein the mechanical screw press comprises a choke.

20. A method of extracting liquids from a process material, comprising:

reducing a volume of the process material;

increasing the volume of the process material; and

reducing the volume of the process material, wherein the steps of reducing, increasing, and reducing are performed in a mechanical screw press.

21. The method of Claim 20, wherein the mechanical screw press comprises an assembly of worms and/or flights in a tunnel provided with a feed end and a discharge end.

22. The method of Claim 21, wherein the worm assembly comprises at least one mixer region.

23. The method of Claim 22, wherein the mixer region comprises an element adapted to disrupt a flow of the material.

24. The method of Claim 22, wherein the mixer region comprises at least one of a multirecessed cog and a toothed disc.

25. The method of Claim 22, wherein the mixer region further comprises a compressor region.

26. The method of Claim 25, wherein the mixer region comprises a frusto conical member.

27. The method of Claim 26, wherein the frusto conical member is smaller in diameter at a feed inlet end and greater in diameter at a discharge end.

28. The method of Claim 27, wherein the compressor region is positioned at the discharge end.

29. The method of Claim 27, wherein the compressor region is positioned at between 50 to 60% of the length of the worm assembly as measured from the feed inlet end.

30. The method of Claim 25, wherein the mixer region is positioned approximately in the middle of the worm assembly.

31. The method of Claim 25, wherein the compressor region is positioned at between 50 and 65% of the length of the worm assembly.

32. The method of Claim 21, wherein the worm assembly comprises a plurality of mixer regions.

33. The method of Claim 32, wherein the mixer regions are substantially evenly spaced along the length of the worm assembly.

34. The method of Claim 33, wherein a first mixer region is positioned between 25 to 40% of the length of the worm assembly, and a second mixer region is positioned between 60 and 80% of the length of the worm assembly.

35. The method of Claim 20, further comprising:

controlling flow of the process material using a temperature control element.

36. The method of Claim 20, wherein the mechanical screw press comprises a choke.

37. A mechanical screw press, comprising:

a worm assembly that is adapted to extract liquids from a process material by compressing, decompressing, mixing; and recompressing the process material.

38. The mechanical screw press of Claim 37, wherein the worm assembly is disposed in a tunnel provided with a feed end and a discharge end.

39. The mechanical screw press of Claim 38, wherein the worm assembly comprises at least one mixer region.

40. The mechanical screw press of Claim 39, wherein the mixer region comprises an element adapted to disrupt a flow of the material.

41. The mechanical screw press of Claim 39, wherein the mixer region comprises at least one of a multirecessed cog and a toothed disc.

42. The mechanical screw press of Claim 39, wherein the mixer region further comprises a compressor region.

43. The mechanical screw press of Claim 42, wherein the mixer region comprises a frusto conical member.

44. The mechanical screw press of Claim 43, wherein the frusto conical member is smaller in diameter at a feed inlet end and greater in diameter at a discharge end.

45. The mechanical screw press of Claim 44, wherein the compressor region is positioned at the discharge end.

46. The mechanical screw press of Claim 44, wherein the compressor region is positioned at between 50 to 60% of the length of the worm assembly as measured from the feed inlet end.

47. The mechanical screw press of Claim 42, wherein the mixer region is positioned approximately in the middle of the worm assembly.

48. The mechanical screw press of Claim 42, wherein the compressor region is positioned at between 50 and 65% of the length of the worm assembly.

49. The mechanical screw press of Claim 38, wherein the worm assembly comprises a plurality of mixer regions.

50. The mechanical screw press of Claim 49, wherein the mixer regions are substantially evenly spaced along the length of the worm assembly.

51. The mechanical screw press of Claim 50, wherein a first mixer region is positioned between 25 to 40% of the length of the worm assembly, and a second mixer region is positioned between 60 and 80% of the length of the worm assembly.

52. The mechanical screw press of Claim 37, further comprising:

a temperature control element that is configured to control a flow of the process material.

53. The mechanical screw press of Claim 37, wherein the mechanical screw press further comprises a choke.

54. A mechanical screw press, comprising:

a worm assembly that is adapted to extract liquids from a process material by reducing a volume of the process material, increasing the volume of the process material, and reducing the volume of the process material.

55. The mechanical screw press of Claim 54, wherein the worm assembly is disposed in a tunnel provided with a feed end and a discharge end.

56. The mechanical screw press of Claim 55, wherein the worm assembly comprises at least one mixer region.

57. The mechanical screw press of Claim 56, wherein the mixer region comprises an element adapted to disrupt a flow of the material.

58. The mechanical screw press of Claim 56, wherein the mixer region comprises at least one of a multirecessed cog and a toothed disc.

59. The mechanical screw press of Claim 56, wherein the mixer region further comprises a compressor region.

60. The mechanical screw press of Claim 59, wherein the mixer region comprises a frusto conical member.

61. The mechanical screw press of Claim 60, wherein the frusto conical member is smaller in diameter at a feed inlet end and greater in diameter at a discharge end.

62. The mechanical screw press of Claim 61, wherein the compressor region is positioned at the discharge end.

63. The mechanical screw press of Claim 61, wherein the compressor region is positioned at between 50 to 60% of the length of the worm assembly as measured from the feed inlet end.

64. The mechanical screw press of Claim 59, wherein the mixer region is positioned approximately in the middle of the worm assembly.

65. The mechanical screw press of Claim 59, wherein the compressor region is positioned at between 50 and 65% of the length of the worm assembly.

66. The mechanical screw press of Claim 55, wherein the worm assembly comprises a plurality of mixer regions.

67. The mechanical screw press of Claim 66, wherein the mixer regions are substantially evenly spaced along the length of the worm assembly.

68. The mechanical screw press of Claim 67, wherein a first mixer region is positioned between 25 to 40% of the length of the worm assembly, and a second mixer region is positioned between 60 and 80% of the length of the worm assembly.

69. The mechanical screw press of Claim 54, further comprising:

a temperature control element that is configured to control a flow of the process material.

70. The mechanical screw press of Claim 54, wherein the mechanical screw press further comprises a choke.